

45118 / B

ESSAY XVIII.

OF THE EXCELLENT QUALITIES OF
COFFEE,
AND THE ART OF MAKING IT IN THE
HIGHEST PERFECTION.

ILLUSTRATED BY COPPER-PLATES.

BY BENJAMIN COUNT OF RUMFORD, F.R.S.



14182

H 7/12/05
562

ESSAY XVIII.

THE use of science is to explain the operations which take place in the practice of the arts, and to discover the means of improving them; and there is no process, however simple it may appear to be, that does not afford an ample field for curious and interesting investigation.

As those domestic arts, and elegant refinements, which the progress of industry, and the increase of wealth and knowledge introduce in society, contribute to the comfort and happiness of great numbers of respectable individuals; their improvement must be interesting to all those who take pleasure in contemplating the prosperity of mankind, and in contributing to their innocent enjoyments.

Among the numerous luxuries of the table, unknown to our forefathers, which have been imported into Europe in modern times, *Coffee* may be considered as one of the most valuable.

Its taste is very agreeable, and its flavour uncommonly so ; but its principal excellence depends on its salubrity, and on its exhilarating quality.

It excites cheerfulness, without intoxication ; and the pleasing flow of spirits which it occasions, lasts many hours, and is never followed by sadness, languor, or debility.

It diffuses over the whole frame, a glow of health, and a sense of ease and well-being, which is exceedingly delightful. Existence is felt to be a positive enjoyment, and the mental powers are awakened, and rendered uncommonly active.

It has been facetiously observed, that there is more wit in Europe since the use of Coffee has become general among us ; and I do not hesitate to confess, that I am seriously of that opinion.

Some of the ablest, most brilliant, and most indefatigable men I have been acquainted with, have been remarkable for their fondness for Coffee ; and I am so persuaded of its powerful effects in clearing up the mind, and invigorating its faculties, that on very interesting occasions, I have several times taken an additional dose of it for that very purpose.

That Coffee has greatly contributed to our innocent enjoyments, cannot be doubted ; and experience has abundantly proved, that so far from being unwholesome, it is really very salubrious.

This delicious beverage has so often been celebrated, both in prose and verse, that it does not stand in need of my praises to recommend it ; I
shall

I shall therefore confine myself to the humble office of shewing how it can be prepared in the greatest perfection *.

There is no culinary process that is liable to so much uncertainty in its results, as the making of Coffee; and there is certainly none in which any small variation in the mode of operation, produces more sensible effects.

With the same materials, and even when used in the same proportions, this liquor is one day good, and the next bad; and nobody perhaps can even guess at the cause of this difference; and what renders these variations of greater importance, is this remarkable circumstance, that when Coffee is bad, when it has lost its peculiar aromatic flavour, which renders it so very agreeable to the organs of

* If I have abstained from giving a botanical description of the evergreen shrub which produces Coffee; with an account of its culture, and the various attempts that have been made by chemists to analyze its grain, it is because this information (which would necessarily take up a good deal of room, without being particularly interesting to most readers) may be found in other books.

The same reasons have prevented my giving a history of the introduction of the use of Coffee in Europe, and of the introduction of the plant which produces it, into the American Islands, and from thence into the tropical regions of the Continent of America.

It is well known that this precious plant was first found growing wild in Arabia; and that it does not prosper, except in very hot climates, and in hilly countries.

taste and of smell ; it has lost its exhilarating qualities, and with them, all that was valuable in it.

Different methods have been employed in making Coffee ; but the preparation of the grain is nearly the same in all of them. It is first roasted in an iron pan, or in a hollow cylinder, made of sheet-iron, over a brisk fire ; and when, from the colour of the grain, and the peculiar fragrance which it acquires in this process, it is judged to be sufficiently roasted, it is taken from the fire, and suffered to cool. When cold it is pounded in a mortar ; or ground in a hand-mill to a coarse powder, and preserved for use.

Great care must be taken in roasting Coffee, not to roast it too much ; as soon as it has acquired a deep cinnamon colour, it should be taken from the fire, and cooled ; otherwise much of its aromatic flavour will be dissipated, and its taste will become disagreeably bitter.

In some parts of Italy, Coffee is roasted in a thin Florence flask, slightly closed by means of a loose cork. This is held over a clear fire of burning coals, and continually agitated. As no visible vapour ever makes its appearance within the flask, the colour of the Coffee may be distinctly seen through the glass, and the proper moment seized for removing the Coffee from the fire.

I have endeavoured to improve this Italian method, by using a thin globular glass vessel, with
a long

a long narrow cylindrical neck. This globular vessel is six inches in diameter, and its cylindrical neck is one inch in diameter and eighteen inches long. It is laid down horizontally, and supported in such manner on a wooden stand, as to be easily turned round its axis. The globular vessel projects beyond the stand, and is placed, at a proper height, immediately over a chaffing dish of live coals. When this globular vessel is blown sufficiently thin; and when care is taken to keep it constantly turning round, when it is over the fire, there is not the smallest danger of its being injured by the heat, however near it may be to the burning coals.

In order that Coffee may be perfectly good, and very high flavoured, not more than half a pound of the grain should be roasted at once; for when the quantity is greater, it becomes impossible to regulate the heat in such a manner as to be quite certain of a good result.

The end of the cylindrical neck of the globular vessel should be closed by a fit cork, having a small slit in one side of it, to permit the escape of the vapour out of the vessel. This cork should project about an inch beyond the extremity of the neck of the vessel, in order that it may be used as a handle in turning the vessel round its axis, towards the end of the process, when the neck of the vessel becomes very hot. The progress of the operation, and the moment most proper to put an end to it, may be judged, and determined with great certainty; not

only by the changes which take place in the colour of the grain; but also by the peculiar fragrance which will first begin to be diffused by it, when it is nearly roasted enough.

This fragrance is certainly owing to the escape of a volatile, aromatic, substance; which did not originally exist, *as such*, in the grain; but which is formed in the process of roasting it.

By keeping the neck of the globular vessel cold, by means of wet cloths, I found means to condense this aromatic substance, together with a large portion of aqueous vapour, with which it was mixed.

The liquor which resulted from this condensation, which had an acid taste, was very high flavoured, and as colourless as the purest water; but it stained the skin of a deep yellow colour; which could not be removed by washing with soap and water; and this stain retained a strong smell of Coffee several days.

I have made several unsuccessful attempts to preserve the fragrant aromatic matter which escapes from Coffee when it is roasting, by transferring it to other substances. Perhaps others may be more fortunate.

But I must not suffer myself to be inticed away from my subject by these interesting speculations.

If the Coffee in powder is not well defended from the air, it soon loses its flavour, and becomes of little value; and the liquor is never in so high perfection

fection, as when the Coffee is made immediately after the grain has been roasted.

This is a fact well known to those who are accustomed to drinking Coffee, in countries where the use of it is not controuled by the laws; and if a government is seriously disposed to encourage the general use of Coffee, individuals must be permitted to roast it in their own houses.

As the roasting and grinding of Coffee takes up some considerable time, and cannot always be done without inconvenience at the moment when the Coffee is wanted; I contrived a box for keeping the ground Coffee, which I have found, by several years' experience, to preserve the Coffee much better than any of the vessels commonly used for that purpose. It is a cylindrical box made of strong tin, four inches and a quarter in diameter, and five inches in height, formed as accurately as possible within, to which a piston is so adapted, as to close it very exactly; and when pressed down into it, to remain in the place where it is left, without being in danger of being pushed upwards by the elasticity of the ground Coffee, which it is destined to confine.

This piston is composed of a circular plate of very stout tin, which is soldered to the lower part of an elastic hoop of tin, about two inches wide, which is made to fit into the cylindrical box as exactly as possible; and so as not to be moved up and down in it, without employing a considerable force.

force. This hoop is rendered elastic, by means of a number of vertical flits made in the sides of it.

On the upper side of the circular plate of tin, which closes this hoop below, and in the centre of it, there is fixed a strong ring, of about one inch in diameter, which serves instead of a piston rod, or a handle for the piston. The cylindrical box is closed above by a cover, which is fitted to it with care, in order that the air, which is shut up within the box (between the piston and the cover) might be well confined.

Before I proceed to describe the apparatus I shall recommend for making Coffee, it will be useful to enquire what the causes are, which render the preparation of that liquor so precarious; and in order to facilitate that investigation, we must see what the circumstances are, on which the qualities depend, which are most esteemed in Coffee.

Boiling hot water extracts from Coffee, which has been properly roasted and ground, an aromatic substance, of an exquisite flavour, together with a considerable quantity of astringent matter, of a bitter, but very agreeable taste; but this aromatic substance, which is supposed to be an oil, is extremely volatile; and is so feebly united to the water, that it escapes from it into the air with great facility.

If a cup of the very best Coffee, prepared in the highest perfection, and boiling hot, be placed on a table, in the middle of a large room, and suffered

to cool, it will in cooling fill the room with its fragrance; but the Coffee, after having become cold, will be found to have lost a great deal of its flavour.

If it be again heated, its taste and flavour will be still farther impaired; and after it has been heated and cooled two or three times, it will be found to be quite vapid and disgusting.

The fragrance diffused through the air is a sure indication that the Coffee has lost some of its most volatile parts; and as that liquor is found to have lost its peculiar flavour, and also *its exhilarating quality*, there can be no doubt but that both these depend on the preservation of those volatile particles which escape into the air with such facility.

If the liquid were perfectly at rest, the volatile particles disseminated in it, could not escape; or at least not with the same facility as when it is agitated. Those at the surface of the liquid might fly off, but those below the surface would be confined and preserved.

Now all liquids, that are either heated or cooled, are necessarily disturbed and agitated; and the internal motions into which their particles are thrown, do not cease, till the heating or cooling process has ceased.

As the particles of fluids are much too small to be visible, the motions which take place among them cannot be seen; but means have nevertheless

less been found to render these motions quite evident.

If a small quantity of any solid substance, in the form of a coarse powder, and having the same specific gravity as any transparent liquid, be mixed with it, and the liquid be either heated or cooled, the currents formed in the liquid in consequence of the change of its temperature, will carry along with them the visible particles of the powder, diffused in the liquid, and the directions and velocities of those currents will become apparent.

The cause of these motions among the particles of liquids, that are heated or cooled, is perfectly known.

When a hot liquid is cooled, those of its particles which are the first exposed to the cooling influence, on losing a part of their heat, become specifically heavier than they were before; consequently they become specifically heavier than the surrounding hotter particles, which causes them to descend towards the bottom of the containing vessel.

This descent of the particles which are cooled necessarily puts the whole mass of the liquid in motion. The warmer and lighter particles are continually rising towards the surface of the liquid; while the colder and heavier particles are descending; and these motions never can cease, till the whole of the liquid has acquired the precise temperature of the surrounding atmosphere.

When

When the liquid is heated, similar motions take place; but in an opposite direction. The particles first heated, being rendered specifically lighter by this augmentation of temperature, rise upwards; and give place to the colder and heavier particles which descend.

These motions may be rendered visible by a very simple contrivance.

If one ounce of common salt be dissolved in eight ounces of water, a brine will be formed, which will have the same specific gravity as yellow amber; consequently, if a small quantity of that solid substance be pounded in a mortar, so as to be reduced to a coarse powder (of about the size of mustard seeds), this powder, on being put into the brine, will remain suspended in that liquid, and in all parts of it, without either sinking or rising to its surface; and the particles of the amber being visible in the brine, will, by their motions, indicate the motions and directions of the currents in the liquid, which take place when the temperature of the liquid is changed*.

If now, two like glass tumblers be filled, the one with the pure brine moderately heated, the other with an equal quantity of the same brine, at the same temperature, containing a small quantity of the powdered amber, intimately mixed with it, on

* In order that the brine may be rendered perfectly transparent, it should be filtered, or made to pass through filtering paper.

exposing these two glafs vessels with their contents, to cool in the air, in a quiet room, no motion will be perceived among the particles of the pure brine (which are invifible), but the motions which will be feen to take place among the particles of amber in the other tumbler, will afford a convincing proof that the apparent reft in the pure brine muft neceffarily be a deception ; and that the particles of both thefe mafles of cooling liquid are moft undoubtedly in motion.

As foon as thefe liquids have acquired the temperature of the furrrounding atmofphere, their internal motions will ceafe ; but on every change of temperature they will recommence.

We may conceive the particles of amber, diffeminated in the brine, to represent the particles of the aromatic fubftance, diffeminated in new-made Coffee : as long as the Coffee remains at reft, that is to fay, as long as its temperature remains unchanged, thefe aromatic particles cannot efcape ; for they cannot come to the furface of the liquid ; but when the liquid is put in motion, their efcape is greatly facilitated.

When the caufe of any evil is perfectly known, it is feldom very difficult to find means to prevent it.

In order that Coffee may retain all thofe aromatic particles which give to that beverage its excellent qualities, nothing more is neceffary, than to prevent all internal motions among the particles of that
liquid ;

liquid ; by preventing its being exposed to any change of temperature, either during the time employed in preparing it ; or afterwards, till it is served up.

This may be done, by pouring boiling water on the Coffee in powder ; and surrounding the machine in which the Coffee is made, by boiling water ; or by the steam of boiling water : for the temperature of boiling water is *invariable*, (while the pressure of the atmosphere remains the same,) and the temperature of steam is the same as that of the boiling water from which it escapes.

But the temperature of boiling water is preferable to all others for making Coffee, not only on account of its *constancy*, but also, on account of its being most favourable to the extraction of all that is valuable in the roasted grain.

As it is well known that the heat of boiling water is not that which is the most favourable for extracting from malt those saccharine parts which it furnishes in the process of making beer ; I thought it possible, though not at all probable, that some lower temperature than that of boiling water, might also be most advantageous in preparing Coffee ; but after having made a great number of experiments, in order to ascertain that important point, I found that Coffee, infused with boiling water, was always higher flavoured, and better tasted, than when the water used in that process was at a lower temperature.

I have

I have frequently taken Coffee, of the best quality, newly burnt, and with equal portions of it, in powder, and equal quantities of water, have made Coffee, in two like coffee-pots, with this single difference, that the water poured into one of them has been boiling hot; while that poured into the other, has been at some lower temperature; and I have constantly found, that the Coffee made with the boiling water has been preferred by all good judges; especially when they have been presented with the two kinds of Coffee at the same time, without being told in what manner they were prepared.

I have likewise made Coffee with cold water, and afterwards heated it; but this I have always found to be *of a very inferior quality*: it is very bitter, and not unfrequently of a sour disagreeable taste, especially when the cold water is a long time in passing through to Coffee in powder, and when they are suffered to remain together over night.

The fine aromatic substance is either not extracted by cold water, or it escapes afterwards, while the Coffee is heating. — The fact is, that very little of it can be perceived in the Coffee, after it has been heated; nor does Coffee, so prepared, possess those exhilarating qualities which render that beverage so delightful in its effects, when it is made in perfection, and taken before it has had time to be spoiled by cooling. As Coffee is an expensive article, which must be imported into Europe from hotter climates,

climates, the economy of it deserves attention; now it is quite certain that boiling water extracts from the prepared grain, more of those particles which give the agreeable taste and flavour to the Coffee, or, in other words, that give it *strength*, than an equal quantity of water less hot: this fact has been ascertained by many experiments, and is now generally acknowledged: it is indeed not a little surprising, that it should ever have been called in question; for the agency of heat, in facilitating solutions of this kind, has long been known.

As all kinds of agitation must be very detrimental to Coffee, not only when made, but also while it is making, it is evident that the method formerly practised, that of putting the ground Coffee into a coffee-pot, with water, and boiling them together, must be very defective, and must occasion a very great loss.

But that is not all; for the Coffee which is prepared in that manner can never be good, whatever may be the quantity of ground Coffee that is employed.

The liquor may, no doubt, be very bitter, and it commonly is so; and it may possibly contain something that may irritate the nerves, but the exquisite flavour and exhilarating qualities of good Coffee will be wanting.

A decoction of Jesuit's bark is also very bitter, and it is sometimes irritating, but nobody ever found it to be exhilarating; custom might perhaps

render the taste of it agreeable, for even the taste of tobacco becomes agreeable to those who are in the habit of chewing it; but it would be difficult to persuade me, or any other unprejudiced person, that Coffee is good, which has nothing to recommend it but a strong, bitter, austere taste.

Coffee may easily be too bitter, but it is impossible that it should ever be too fragrant. The very smell of it is reviving, and has often been found to be useful to sick persons, and especially to those who are afflicted with violent head-achs. In short, every thing proves that the volatile, aromatic matter, whatever it may be, that gives flavour to Coffee, is what is most valuable in it, and should be preserved with the greatest care; and that in estimating the strength, or richness of that beverage, its *fragrance* should be much more attended to, than either its bitterness or its astringency.

Nobody, I fancy, can be fonder of Coffee than I am; I have regularly taken it twice a day, for many years, and I certainly take care to have the very best that can be procured, and no expence is spared in making it good.

The reader will no doubt be surpris'd, when I assure him, that one pound averdupois, of good Moka Coffee, which, when properly roasted and ground, weighs only fourteen ounces, serves for making fifty-six full cups of the very best Coffee, in my opinion, that can be made.

The

The quantity of ground Coffee which I use for one full cup, is 108 grains Troy, which is rather less than a quarter of an ounce. This Coffee, when made, would fill a coffee-cup, of the common size, quite full; but I use a larger cup, into which the Coffee being poured boiling hot, on a sufficient quantity of sugar (half an ounce), I pour into it about one-third of its volume of good sweet cream, *quite cold*. On stirring these liquids together, the Coffee is *suddenly cooled*, and in such a manner as not to be exposed to the loss of any considerable portion of its aromatic particles in that process.

In making Coffee, several circumstances must be carefully attended to: in the first place, the Coffee must be ground fine, otherwise the hot water will not have time to penetrate to the centers of the particles; it will merely soften them at their surfaces, and passing rapidly between them, will carry away but a small part of those aromatic and astringent substances on which the goodness of the liquor entirely depends.

In this case, the grounds of the Coffee are more valuable than the insipid wash which has been hurried through them, and afterwards served up under the name of Coffee.

This secret has been but too well known to some servants abroad, where Coffee is more generally used than in England, and where the preparation of it has not been controuled by the laws. When complaints are made that the Coffee is too weak,

they are never at a loss for a remedy for that evil ; and when it has once been established as a rule in the family, that *one ounce* of ground Coffee is *indispensably necessary* to make a cup of good strong Coffee, their point is gained.

But before we can determine with certainty how much ground Coffee is necessary in order to make a cup of good Coffee, we must ascertain the contents of a coffee-cup ; and as the sizes of coffee-cups are very different in different countries, and even vary considerably in the same country, we must begin by adopting some certain size, to serve as a standard. — The size most commonly to be met with in England, and in France, is a cup which contains $8\frac{1}{3}$ cubic inches, English measure, when filled quite full to the brim ; when this cup is made perfectly cylindrical within, and just as high as it is wide, it will be $2\frac{2}{5}$ English inches in diameter, and consequently $2\frac{2}{5}$ inches in height, internally.

One gill, or one quarter of a wine pint of liquor, will fill this cup to within *three-tenths* of an inch of the level of its brim, and that quantity of Coffee will weigh 1820 grains Troy, or something more than four ounces averdupois, or more exactly $4\frac{1}{6}$ ounces.

As a *gill* is a measure well known in England, I shall adopt it as a standard measure for a cup of Coffee ; and as it is inconvenient to fill coffee-cups quite full to the brim, I shall propose coffee-cups to be made of the form and dimensions they now

commonly have, or of a size proper for containing $8\frac{1}{3}$ cubic inches of liquor, when filled quite full to the brim.

As a gill is equal to 7.1875 cubic inches, about seven-eighths only of the capacity of the cup will, in that case, be occupied by the Coffee. — Now I have found, by the results of a great number of experiments, that *one quarter of an ounce* averdu-pois of ground Coffee is quite sufficient to make a gill of most excellent Coffee, of the highest possible flavour, and quite strong enough to be agreeable.

This decision has been the result of fifteen years' experience, and as Coffee is to me by far the most valuable luxury of the table, with which I am acquainted, and that in which I indulge with the greatest pleasure and satisfaction, I have spared no pains in my endeavours to find out how it can be prepared in the highest perfection: and I can safely assert that economy has not, in the smallest degree, influenced my opinion on that subject.

I am happy when I find that improvement leads to economy, but I have always thought that excellence should never be sacrificed to paltry savings in any thing, and least of all in those habitual enjoyments which are at the same time the comforts and consolations of life.

The fact is, with respect to Coffee, that when it is made very strong, its taste becomes so very bitter and austere, that it is no longer possible to distinguish that delicate aromatic fragrance which is

so liberally diffused when the Coffee is properly prepared.

Habit may render very bitter Coffee agreeable to some palates, and all persons may not perhaps be able to savour in perfection that peculiar fragrance which renders the smell of Coffee so very agreeable; but I am confident, that those who will take the trouble to make the experiment with due care, will find, as I have done, that Coffee, of the very best quality, may be prepared with the quantity of materials above-mentioned.

But this cannot be done, unless the method which I use be employed for making the Coffee.

In order that the advantages which will result from the adoption of that process may be perceived and estimated, it will be useful to give a short description of the method formerly pursued, and to explain the disadvantages which resulted from it.

Formerly, the ground Coffee being put into a coffee-pot, with a sufficient quantity of water, the coffee-pot was put over the fire, and after the water had been made to boil a certain time, the coffee-pot was removed from the fire, and the grounds having had time to settle, or having been fined down with ising-glass, the clear liquor was poured off, and immediately served up in cups.

From the results of several experiments, which I made with great care, in order to ascertain what proportion of the aromatic and volatile particles in the Coffee escape, and are left in this process, I
found

found reason to conclude, that it amounts to considerably more than half. This loss may easily be explained; it is occasioned principally, no doubt, by the motions into which the liquid is thrown in being heated, and afterwards on being made to boil; but there are two other unfavourable circumstances attending this process that deserve attention.

The air that is attached to the small solid particles of the ground Coffee, often remain attached to them, and causing them to rise up to the surface of the water, and to remain there, these particles contribute very little to the strength or qualities of the liquor; and even those particles which, becoming thoroughly soaked with the water, are mixed with it; as they are surrounded, not by pure water, but by a solution of Coffee, more or less saturated, that circumstance is unfavourable to their solution.

It is well known to chemists, that any solid substance, which is soluble in any liquid menstruum, is dissolved with greater difficulty, or more slowly, as the liquid is more charged with that substance.

Now, when Coffee is made in the most advantageous manner, the ground Coffee is pressed down in a cylindrical vessel, which has its bottom pierced with many small holes, so as to form a strainer, and a proper quantity of boiling hot water being poured cautiously on this layer of Coffee in powder, the water penetrates it by degrees, and after a certain time begins to filter through it.

This gradual percolation brings continually a succession of fresh particles of pure water into contact with the ground Coffee, and when the last portion of the water has passed through it, every thing capable of being dissolved by the water, will be found to be so completely washed out of it, that what remains will be of no kind of value.

It is however necessary to the complete success of this operation, that the Coffee should be ground to a powder sufficiently fine, as has already been observed.

This method of making Coffee, by percolation, has been practised many years, and its usefulness is now universally acknowledged. I do not know who was the first to propose it, but being thoroughly persuaded of the merit of the contrivance, I have been desirous of recommending it; and I conceived that the most effectual way of recommending it, would be to explain the mechanical and chemical principles on which its superiority depends.

In order that the Coffee may be perfectly good, the stratum of ground Coffee, on which the boiling water is poured, must be of a certain thickness, and it must be pressed together with a certain degree of force. If it be too thin, or not sufficiently pressed together, the water will pass through it too rapidly; and if the layer of ground Coffee be too thick, or if it be too much pressed together, the water will be too long in passing through it, and the taste of the Coffee will be injured.

Another

Another circumstance, to which little attention has hitherto been paid, but which I have found to be of considerable importance, is the levelling of the surface of the ground Coffee, after it has been put into the strainer, before any attempt is made to press it together.

When the ground Coffee is poured into the strainer it always stands much higher in one part of this vessel than elsewhere; and if, in that situation, it be pressed down on the perforated bottom of this vessel, without being previously levelled, it will be much more pressed in some parts than in others; and as the water will not fail to pass most rapidly, where it meets with the least resistance, a considerable portion of the ground Coffee will be so crowded together as to prevent the water from passing through it, and consequently will contribute little or nothing to the strength of the beverage.

To remedy this inconvenience, I use the following simple contrivance: The circular plate of tin, with a rod fastened to its centre, which serves as a rammer for pressing down the ground Coffee, has four small projecting square bars, of about one-tenth of an inch in width, fastened to the under side of it, and extending from the circumference of the plate to within about one quarter of an inch of its centre.

On turning this plate round its axis, by means of the rod which serves as a handle to it, (the rod being made to occupy the axis of the cylindrical vessel,)

vessel,) the projecting bars are made to level the ground Coffee; and after this has been done, and not before, the Coffee is pressed together.

This circular plate is pierced by a great number of small holes, which permit the water to pass through it, and it remains in the cylindrical vessel during the whole of the time that the Coffee is making. It reposes on the surface of the ground Coffee, and prevents its being thrown out of its place by the water which is poured on it.

The rod which serves as a handle to this circular plate is so short, that it does not prevent the cover of the cylindrical vessel from being put down into its place.

After having made a great number of experiments, in order to determine what thickness is best for the layer of ground Coffee, I have found that two-thirds of an inch answers best for the Coffee in powder, before it is pressed together, and that it ought to be so pressed as to be reduced to the thickness of something less than *half an inch*.

And as the quantity of ground Coffee necessary for making a cup of good Coffee (a quarter of an ounce averdupois) just fills a cylindrical measure, which is 1.15 inches in diameter and in height, its volume amounts to 1.1945 cubic inches; consequently, a cylindrical vessel (which I shall call the strainer) proper for making *one cup of Coffee*, must be of such diameter that 1.1945 cubic inches
of

of ground Coffee will fill it to the height of two-thirds of an inch.

On making the computation, it will be found that one inch and a half is the most proper diameter for the strainer to be employed in making one single cup of good Coffee. And as the thickness of the stratum of ground Coffee must always be the same, whatever may be the number of cups that are made at the same time; the diameter of strainers, of different sizes, will be as follows, viz.

	Inches.
For 1 cup - - - -	1.5
2 - - - -	2.1213
3 - - - -	2.5986
4 - - - -	3
5 - - - -	3.3541
6 - - - -	3.6742
7 - - - -	3.9687
8 - - - -	4.2426
9 - - - -	4.5
10 - - - -	4.7434
11 - - - -	4.9749
and for 12 - - - -	5.1962

For common use, the following sizes will answer very well; and, in order that workmen may not have the trouble of computing the heights of the cylindrical vessels, which I have called strainers, which contain the water that is poured on the
ground

ground Coffee, I have given these heights in the following Table. They have been determined on the supposition, that the diameter of the vessel is always just equal to the diameter of the perforated bottom by which it is closed below; and that the quantity of water necessary for making one cup of Coffee, is $8\frac{1}{3}$ cubic inches.

A Table, shewing the diameters and heights of the cylindrical vessels (or strainers) to be used in making the following quantities of Coffee :

Quantity of Coffee to be made at once.	Diameter of the strainer.	Height of the strainer.
1 cup - - -	$1\frac{1}{2}$ inches	$5\frac{1}{4}$ inches.
2 cups - - -	$2\frac{1}{8}$ - - -	$5\frac{1}{4}$
3 or 4 cups -	$2\frac{3}{4}$ - - -	5
5 or 6 cups -	$3\frac{1}{2}$ - - -	$5\frac{1}{8}$
7 or 8 cups -	4 - - -	$5\frac{1}{4}$
9 or 10 cups -	$4\frac{5}{8}$ - - -	$5\frac{1}{3}$
11 or 12 cups -	5 - - -	$5\frac{1}{2}$

As there is so little difference in the heights of these strainers, and as a small additional height will be rather advantageous than otherwise, I would recommend them to be made all of the same height, viz. $5\frac{1}{2}$ inches in height.

As these strainers must be suspended in their reservoirs, which are destined for receiving the Coffee, and at such a height that after all the Coffee has
passed

passed through the strainer, the bottom of the strainer may still be above the surface of the Coffee in the reservoir; it will be best to make the reservoir of a conical form, and just large enough above to receive the strainer in such a manner that it may be suspended in the reservoir by means of a narrow projecting brim.

The boiler in which the reservoir is suspended may likewise be made conical, and of such diameter above, as to receive the reservoir in such a manner as to be firmly united to it.

The reservoir and its boiler must be foldered together above, at their brims; and the reservoir must be suspended in its boiler in such a manner, that its bottom may be about a quarter of an inch above the bottom of the boiler.

The small quantity of water which it will be necessary to put into the boiler, in order that the reservoir for the Coffee may be surrounded by steam, may be introduced by means of a small opening on one side of the boiler, situated above, and near the upper part of its handle.

The spout through which the Coffee is poured out passes through the side of the boiler, and is fixed to it by foldering. The cover of the boiler serves at the same time as a cover for the reservoir, and for the cylindrical strainer, and it is made double, in order more effectually to confine the heat.

The

The boiler is fixed below to a hoop, made of sheet-brass, which is pierced with many holes. This hoop, which is one inch in width, and which is firmly fixed to the boiler, serves as a foot to it, when it is set down on a table, and it supports it in such a manner, that the bottom of the boiler is elevated to the height of half an inch above the table.

When the boiler is heated over a spirit lamp, or over a small portable furnace in which charcoal is burnt, as the vapour from the fire will pass off through the holes made in the sides of the hoop, the bottom of the hoop will always remain quite clean, and the table-cloth will not be in danger of being soiled, when this coffee-pot is set down on the table.

As the hoop is in contact with the boiler, in which there will always be some water, it will be so cooled by this water as never to become hot enough to burn the table-cloth.

The bottom of the boiler may be cleaned occasionally, on the underside with a brush or a towel, but it should not be made bright, for when it is bright it will be more difficult to heat the water in it than when it is tarnished and of a dark brown colour.

But the sides of the boiler should be kept as bright as possible, for when its external surface is kept clean and bright, the boiler will be less cooled by the surrounding cold bodies, than when its
metallic

metallic splendour is impaired by neglecting to clean it *.

As the small quantity of water which is put into the boiler serves merely for generating the steam which is necessary in order to keep the reservoir and its contents constantly boiling-hot; if the reservoir be made of silver, or even of common tin, the boiler may, without the smallest danger, be made of

* I have in my possession two porcelaine tea-pots of the same form and dimensions, one of which is gilt all over on the outside, and might easily be mistaken for a gold tea-pot; the other is of its natural white colour, both within and without; being neither painted nor gilt. When they are both filled at the same time with boiling water, and exposed to cool in the same room, that which is gilt retains its heat half as long again as that which is not gilt. The times employed in cooling them, a given number of degrees, are as three to two.

The result of this interesting experiment (which I first made about seven years ago) affords a good and substantial reason for the preference which English ladies have always given to silver tea-pots.—The details of this experiment may be seen in a paper published in the Memoirs of the French National Institute for the year 1807.

I have likewise a set of tea-cups, and another of coffee-cups, which are gilt on the outside, and they preserve the heat of those liquids, much longer than China-cups which are not so gilt.

Little advantage would be derived from gilding them on the inside, and none at all if they were filled quite full with the hot liquid.

I have found that **all** metals are alike useful in preserving heat (or cold), provided their surfaces be quite clean and bright.

copper;

copper; or of copper plated with silver, which will give to the boiler an elegant appearance, and at the same time render it easy to keep it clean on the outside.

The boiler may likewise be made of tin, and neatly japanned on the outside, provided the hoop to which it is fixed below be made of copper, but this hoop must never be japanned nor painted; and it must always be made of sheet-copper or silver; and the boiler must always be heated over a small portable fire-place or lamp, somewhat less in diameter above, than the hoop on which the boiler is placed.

In order that the flat bottom of the boiler may not smother and put out the fire, the brim of the small furnace or chaffing-dish, which is used, must have six projecting knobs, at the upper part of it, each about one quarter of an inch in height, on which the bottom of the boiler may rest.

If these knobs (which may be the large heads of six nails), be placed at equal distances from each other, the boiler will be well supported; and as the hot vapour from the fire will pass off freely between them, the fire will burn well. As a very small fire is all that can be wanted, no inconvenience whatever will arise from the heating of the boiler on the table, in a dining-room or breakfast-room, especially if a spirit lamp be used, and the quantity of heat wanted is so very small, when the

water

water is put boiling hot into the boiler, that the expence for spirits of wine, would not, in London, amount to one penny a day, when Coffee is made twice a day for four persons.

It is a curious fact, but it is nevertheless most certain, that *in some cases*, spirits of wine is cheaper, when employed as fuel, even than wood. With a spirit lamp, constructed on Argand's principle, but with a chimney made of thin sheet iron, which I caused to be made about seven years ago (and which has since become very common in Paris *), I heated a sufficient quantity of cold water, to make Coffee for the breakfast of two persons, and kept the Coffee boiling hot, one hour after it was made; with as much spirits of wine as cost *two sous*, or one penny English money.

A fire could not have been made with wood at a less expence to heat this water.

As the size of the flame of this lamp may be increased or diminished, at pleasure, by means of the rack which raises and lowers its circular wick, all the fuel which is consumed is usefully employed, and no heat is wasted in forming steam, when nothing more is wanted than the preservation of the temperature at which water is disposed to boil.

* I intend, if possible, to send one of these spirit lamps to England, with this Essay, in order that it may be put into the hands of some workman there, who may be disposed to imitate it.

In order to convey distinct ideas of the different parts of the apparatus necessary in making Coffee in the manner I have recommended, I have added the figure 1, which represents a vertical section (drawn to half the full size) of a coffee-pot constructed on what I conceive to be the very best principles. Its size is such as is most proper for making four cups of Coffee at once.

a—is the cylindrical strainer, into which the ground Coffee is put, in order that boiling hot water may be poured on it; when this strainer is filled with boiling water (after an ounce of ground Coffee has been properly pressed down on its bottom) the quantity of the liquid is just sufficient for making four cups of Coffee.

b—is the ground Coffee in its place.

c—is the handle of the rammer which is represented in its place.

d—is the reservoir for receiving the Coffee which descends into it from the strainer; and

e—is the spout through which the Coffee is poured out.

f—is the boiler, into which a small quantity of water is put, for the sole purpose of generating steam, for keeping the reservoir hot.

g—is the opening by which the water is poured into the boiler or out of it; this opening has a flat cover, which moves on a hinge, that is represented in the figure.

The

The boiler is of a conical form, and is enlarged a little at its upper extremity, in order to receive the cover which closes it above.

The reservoir and the boiler are fixed together above by foldering, so that the reservoir remains suspended in the boiler.

The cylindrical strainer is suspended on the upper extremity of the reservoir, by means of a flat projecting brim, about two-tenths of an inch broad.

b—is the hoop, made of sheet-copper, and perforated with a row of holes, on which the boiler reposes: a part of the bottom of the boiler is seen through these holes.

The reservoir is represented by dotted lines, in order the better to distinguish it.

The opening in the side of the boiler, by which the water enters it, is represented in the figure. This opening is covered by a part of the handle of the coffee-pot.

The diameter of the hoop *b*, on which the coffee-pot stands, should always be at least *six inches in diameter* whatever may be the contents of the coffee-pot; and the spirit lamps or portable furnaces, used with these coffee-pots, should always be *rather less than six inches in diameter above*, or at their openings, in order that the bottom of the coffee-pot may, in all cases, be set down properly on the six knobs belonging to the lamp or the furnace, which are destined to support it.

The figure 2. has been added, in order to shew how the same coffee-pot may be made to serve for making any number of cups of Coffee, within certain limits, that may be wanted, by being furnished with strainers of different sizes.

This coffee-pot has three strainers, the largest of which is cylindrical, and of a size proper for making either *five* or *six* cups of Coffee.

The second in size, is designed for making either *three* cups or *four* cups. It is composed of two tubes or cylinders, of different diameters, united together. The lower cylinder, which is one inch in length, and two inches and three quarters in diameter, is closed below by a perforated bottom, on which the ground Coffee is placed. The upper cylinder, which is united to it, is about three inches in length, and just wide enough to enter without difficulty, into the larger cylindrical strainer, on the top of which it reposes by means of a projecting brim, when not in use.

The smaller strainer, which is of a size proper for making *two* cups of Coffee, enters that last described, and reposes on it (when not in use). This strainer is also composed of two cylinders united together. That which is lowest is two inches and one eighth in diameter and one inch in height, closed below by a flat bottom, perforated with small holes. The other cylinder, which is united to it above, is of such a diameter as to enter the second strainer without difficulty, and of the height which
is

is necessary, in order that it may contain two coffee-cups full of water.

Each of these strainers has its separate rammer to ram down the ground Coffee placed in it, but one common handle serves for them all. This handle is screwed into the middle of a circular plate, which forms the principal part of the rammer.

The circular plate which belongs to each of these strainers, remains in it, when the coffee-pot is not in use, and the handle remains attached to the circular plate belonging to the smaller strainer.

When only *two* cups of Coffee are wanted, the two largest strainers being taken away, the smaller strainer is used alone.

If either *three* or *four* cups are wanted, the smallest and the largest strainers are taken away, and the other strainer is used.

When *five* or *six* cups are wanted, the largest strainer is used, and the other two are taken away.

If *seven*, *eight*, *nine*, or *ten* cups are wanted, *six* cups are first made with the largest strainer; when that strainer being removed, the remaining number of cups are made with the strainer next in size.

By making use of the three strainers one after the other, *eleven* or *twelve* cups of Coffee may be made in this coffee-pot, and as the heat always remains the same during the whole of the time employed in these operations, the Coffee is just as good as if the whole of it were made at once.

By adding two additional strainers to the coffee-pot represented by the figure 1. one of them of a proper size for making *one* cup of Coffee; and the other of a proper size for making *two* cups; this coffee-pot may be used for making either *one, two, three, four, five, or six* cups of Coffee.

All the coffee-pots that have been made of this size, have been furnished with these two additional strainers; but they were omitted in the figure, in order to render it more simple, and more easy to be understood.

Most of the coffee-pots of this size (figure 1.) have had their boilers made sufficiently capacious for heating the water necessary for making the Coffee, as well as that which is required for generating the steam which is employed for keeping the reservoir boiling hot.

This may be done in all cases; but when this method is employed, it will be necessary that the boiler should be furnished with a brass cock, placed about one quarter of an inch above the level of its bottom, in order that the boiling water necessary for pouring on the ground Coffee in the strainer may be drawn off, without removing the boiler from the fire. By placing this brass cock immediately under the handle of the coffee-pot, it may be so united to it as almost to escape observation. I have a coffee-pot of this kind, in which the brass cock, by which the boiling water is drawn off, is entirely concealed in the ornaments of the handle.

I have

I have another, in which the boiling water is poured out by means of a second spout, placed just opposite to that by which the Coffee is poured out ; but in using this coffee-pot, it is indispensably necessary to pour out *at once* all the boiling water that is wanted, and before any water has been put into the strainer.

When coffee-pots are made with two spouts, one for the water, and the other for the Coffee, the handle must be placed between them, and at equal distances from each of them.

I have caused a very beautiful urn to be constructed, with a concealed spirit lamp, which serves for heating water for making either tea or Coffee, and for making both tea and Coffee at the same time. It is represented by the figure 3, which is drawn to a scale of one quarter of the full size.

This urn is placed on what appears to be a block of black marble, seven inches square, and two inches and a quarter in thickness. This is made of strong sheet iron, japanned black, which serves for concealing a spirit lamp, on Argand's principles, which is employed in keeping the water in the urn boiling hot. The foot of the urn is hollow, and serves for concealing the chimney of the lamp.

It is perforated by two rows of small round holes, the one in the moulding at its lower extremity ; which serves for the admission of the air, which is necessary for keeping the lamp burning ; the other near the upper extremity of the foot where it is

united to the body of the urn, which serves as a passage for the escape of the vapour, which is generated in the combustion of the ardent spirits.

There is a large circular hole in the top of the square box (of sheet-iron), on which the urn is placed, which hole is covered and completely concealed by the foot of the urn.

This hole, which is five inches and a half in diameter, is the passage by which the lamp enters when it is placed in the square box : and by means of a rim about a quarter of an inch in width and five inches and a half in diameter, which is fixed to the lower part of the foot of the urn, and which enters the circular hole in the top of the box ; by turning round the urn to the left, one quarter of a whole revolution, the rim attached to the foot of the urn being in its place, the urn and the square box are locked together, in a manner similar to that which is used in fixing a bayonet to its musket ; and in taking up the urn by its two handles, the square box is taken up along with it, and remains firmly attached to it.

The size of the flame of the lamp is regulated, and the lamp is extinguished when no longer wanted, by means of a rack which moves the wick of the lamp up or down ; and this rack is moved by means of a horizontal rod of strong wire, which lies in a small groove made to receive it in the top of the square box. This wire has a small knob at the end of it, which projects just beyond
the

the side of the box ; and as both this wire and the knob at the end of it are painted black and japanned, they are little observed, and consequently do not produce any disagreeable effect.

Two brass cocks (which are not represented in the figure) are placed at the distance of about four inches from each other, at the level of the bottom of the reservoir which serves for containing the Coffee, when made ; one of these serves for drawing off the boiling water contained in the boiler, and the other for drawing off the Coffee ; and the words *Water* and *Coffee* are inscribed on their handles.

This urn has one large cover, nine inches in diameter, which closes the boiler without closing the opening of the reservoir for the Coffee, and which appears to form the upper part of the urn ; and another cover, about four inches and a quarter in diameter, which being made to fit into a circular hole in the top of the cover of the boiler, closes the reservoir, which contains the cylindrical strainer and the Coffee.

When the boiler is filled with boiling water both covers must be removed ; but the small cover only is removed when the ground Coffee is put into the strainer ; and when boiling water (which may be drawn out of the boiler) is poured on it.

The reservoir for the Coffee is firmly fixed in its place, in the middle of the boiler, by means of three short feet of strong tin (of about half an inch in height),

height), which are foldered to the reservoir, and to the boiler.

The form of the reservoir is conical, and it is about six inches in diameter below, four inches and one-tenth in diameter above, and seven inches and a half in height.

By using two or three strainers successively, *sixteen* or *eighteen* cups of Coffee may be made in this urn; and when the strainers are taken away, and the reservoir is quite filled with Coffee, it will hold more than *twenty* cups.

This urn has been found to be very useful for serving up Coffee after dinner to large companies; and it is the more so, as those who find their Coffee too strong can easily make it weaker, by mixing with it a little boiling water, which may be drawn from the boiler, which is always at hand.

The form of the boiler, and that of its large cylindrical strainer, are faintly represented in the figure by dotted lines.

The boiler must always be filled with water *already boiling hot*; for the lamp, though quite powerful enough to keep this water boiling hot, and even to make it boil with violence, does not furnish heat enough to heat so great a quantity of cold water, and make it boiling hot in any reasonable time.

As often as the smallest quantity of steam is seen to issue from the boiler, the flame of the lamp should be reduced, for no advantage whatever attends

tends the actual boiling of water, which is boiling hot; and it always occasions a very great loss of heat, and fills the room full of steam and of invisible vapour, which makes every thing in it damp and uncomfortable.

A considerable number of these Coffee urns have been made and sold at Paris within these last five or six years; some of them have been made of silver richly sculptured and ornamented by gilding. Several others have been made of copper and ornamented with copper plated with silver; these last, with their lamps, and a set of three strainers made of tin, have cost about six guineas. But the greater part of those which have been sold, have been made of tin; and they have in general been gilt so as to be entirely covered over on the outside with leaf gold, and this leaf gold covered by a coating of transparent varnish.

When so constructed and ornamented, they have cost four guineas with all their apparatus quite complete.

I cannot help flattering myself that they will find their way into England, and there meet with approbation. I shall never cease to be particularly desirous that my labours to improve the domestic arts may be found useful in that country.

The figure 4. represents a small urn with two short spouts and two handles, of a proper size for making one single cup of Coffee. It is drawn to a scale of half the full size. Its boiler contains

water enough to furnish what is required for making the Coffee, as well as that which is necessary for generating steam, for keeping the Coffee hot. The water descends below the foot of the urn into the flat plinth, on which it stands, and to which it is united.

The figure 5. represents an urn with two long spouts, which serve at the same time as handles. Its size is such as would be proper for making either *one* or *two* cups of Coffee. The strainer, which is represented by dotted lines, is of a proper size for making two cups.

Both these urns are destined to be heated over spirit lamps, or small portable furnaces.

It is hardly necessary that I should observe, that in case the forms of either of these urns should be thought inelegant, their sizes may, without any difficulty, be considerably augmented; but when spouts are used with large urns, they occasion a good deal of inconvenience.

As Coffee is very wholesome, and may be afforded at a very low price, especially in countries which have colonies where the climate is proper for growing it, many public advantages would be derived from the general introduction of it among all classes of society.

One most important advantage, which, on a superficial view of the subject, is not very obvious, would most probably be derived from it. As Coffee possesses, in a high degree, an exhilarating quality,
it

it would, in some measure, supply the place of spirituous liquors among the lower classes of the people.

Those who work hard, stand in need of something to cheer and comfort them, from time to time, and it is greatly to be lamented that the strong liquors now used for that purpose, are not only very unwholesome and permanently debilitating, both to the mind and the body, but that their operation is accompanied by a peculiar species of madness, which renders those who are under the influence of it very mischievous, and so lost to all sense of decency and propriety, as to become objects of horror and aversion.

The pleasing flow of spirits that is excited by Coffee, has none of these baneful effects.

Instead of irritating the mind, and exciting to acts of violence, it calms every turbulent and malevolent passion, and is accompanied by a consciousness of ease, contentment, and good-will to all men, which is very different from that wild joy and unbridled licentiousness which accompanies intoxication.

Coffee is not only very wholesome, but when sweetened with sugar, is very nourishing.

Sugar is supposed to be the most nourishing substance known. Its nourishing powers are even such, that the use of it has been recommended in fattening cattle.

An ingenious young man, Doctor ———, a physician, who resided in London, made a long course of experiments on himself, several years ago, with a view to determine the relative nutritive powers of those substances which are most commonly used as food by mankind, and he found that sugar was more nourishing than any other substance he tried.

He took no other food for a considerable time, than sugar, and drank nothing but water; and he contrived to subsist on a surprisingly small quantity of sugar. If my memory does not fail me, it was no more than two ounces a day.

It is much to be lamented, that this interesting young man should have fallen a sacrifice to his zeal in promoting useful science; but his health was so totally deranged by these experiments, which he pursued with too much ardour and perseverance, that he died soon after they were finished. All the resources of the medical art were employed, but nothing could save him.

As common brown sugar is quite as nourishing as the best refined loaf sugar, and as a great many persons prefer it for Coffee, it appears to me to be extremely probable that Coffee may be found to be one of the cheapest kinds of food that can be procured, and more especially in Great Britain.

Half a pint of the best Coffee, or two full cups, may be made with half an ounce of ground Coffee, which, if one pound averdupois weight of raw
Coffee

Coffee can be bought in the shops for twelve-pence sterling, will cost only *six-sevenths* of a farthing; and if a pound of brown sugar can be bought for one shilling, one ounce of sugar, which would be a large allowance for two cups of Coffee, would cost only three farthings; consequently the materials for making half a pint of Coffee would cost less than one penny.

As Coffee has a great deal of taste, which it imparts very liberally to the bread which is eaten with it, and as the taste of Coffee is very agreeable to all palates, and the use of bread greatly prolongs the duration of the pleasure which this taste excites, a very delicious repast may be made merely with Coffee and bread, without either butter or milk.

The taste of the Coffee predominates in such a manner, that the butter would hardly be perceived, and might be omitted without any sensible loss. But I acknowledge, that in my opinion, the addition of a certain quantity of good cream or milk to Coffee, improves it very much. Milk, however, is not a very expensive article in Great Britain; and if the butter be omitted, which is by no means necessary, (and is even unwholesome,) a good breakfast of milk Coffee might be provided for a very small sum.

What a difference between such a breakfast, and that miserable and unwholesome wash which the poor people in England drink under the name of *tea!*

All the Coffee that can be wanted, may be had in the British colonies, and paid for in British manufactures; but tea must be purchased in China, and paid for in hard money.

These are circumstances which ought, no doubt, to have great weight, especially in such a country as England, where all ranks of society are equally sensible of the advantages of their distinguished situation, and equally anxious to promote the public prosperity.

There are some difficulties, no doubt, in changing the habits of a nation, but these difficulties have been too much exaggerated, and they have too often been an excuse for indolence.

If any thing really useful be proposed to the public, it can hardly fail to be adopted, if it be properly recommended; but so many new things, unworthy of notice, are every day proposed, that it is by no means surprising that little attention is paid to such recommendations.

Many useful improvements have been proposed by ingenious and enlightened men, which have failed, merely because those who have brought them forward have neglected to give directions sufficiently clear respecting the details of their execution.

I have been so much persuaded of that important fact, that I have perhaps sometimes erred on the other side, and taken up too much time in describing things, in all their most minute details, which many persons would be able to comprehend at once,

once, and almost without any description ; but I have done that which I thought most likely to render my labours useful.

I never write, except it be to recommend to the public something which I conceive to be of importance, or to communicate the results of new experimental researches, which appear to be sufficiently curious and interesting to merit attention ; and it must, I think, be quite evident to those who read my writings, that I have never hesitated to sacrifice to perspicuity, not only every ornament of style, but also every brilliant idea which, by getting too strong hold of the imagination, might distract the attention.

The reader must condescend not only to go with me frequently into the humblest walks of private life, but also to examine the various objects that present themselves, with the greatest care, and in all their most minute details.

But I must hasten to put an end to this Essay, which has already exceeded the limits to which I had hopes of being able to confine it. Being anxious that it might be read by many persons, (as I thought that it would be very useful,) I felt the necessity of making it as short as possible. I shall conclude with a few observations on the means that may be employed for rendering the use of Coffee more general among the lower classes of society.

In the first place, the method of making *good Coffee* must be known ; and the utensils necessary in

that process must be so contrived, as to be cheap and durable, and easy to be managed.

It will be in vain that the laws are repealed which laid restrictions on the free use of Coffee, as long as the great mass of the people remain ignorant of its excellent qualities; they will be little disposed to substitute it in the place of another beverage, to which long habit has given them an attachment.

As long as Coffee shall continue to be made according to the method generally practised in England, I shall have no hope of its being preferred to tea, for its qualities are so inferior when prepared in that way, that it is hardly possible that it should be much liked.

The utensils which I have recommended for making Coffee, though some of them are sufficiently simple to be afforded at a low price; yet, as they are contrived to be used with spirit lamps, or with portable furnaces, which must be heated with charcoal, they are not well calculated for the use of those persons who inhabit the rooms in which they cook their victuals; and of many others, who though they may have separate kitchens, may not find it convenient to use spirit lamps and portable furnaces.

For the use of such persons, the coffee-pots represented by the figures 1. and 2. may be made to answer perfectly well, merely by taking away the perforated hoops on which they stand. For, when these are taken away, these coffee-pots may be heated
over

over a common chimney fire just as any common coffee-pot is now heated.

For very poor persons, who cannot afford to buy a coffee-pot, I shall recommend a very simple contrivance, by means of which Coffee may be made, and even in the highest possible perfection. —I have often made use of this contrivance in making my own breakfast, and I have not found the Coffee to be in the least inferior to that made in the most costly and complicated machines.

This little utensil is distinct'y represented in the figure 6. which is drawn to a scale of half the full size.

The whole of this apparatus consists of a coffee-cup, which should hold about three quarters of a pint; and a strainer, made of tin, which is suspended in it by its brim.

This coffee-cup should be cylindrical, and when employed in making one gill of good strong Coffee, should be three inches in diameter within, and three inches and a half deep. The lower part of the strainer is one inch and a half in diameter, and one inch deep; and the upper part of it two inches and nine-tenths in diameter, and about one inch and a half in depth.

The water which is poured on the ground Coffee should be boiling hot; the cup and the strainer having both been previously heated, by dipping them into boiling water.

As the Coffee will not be more than eight or ten minutes in passing through the strainer, it is probable that it will be quite as hot as it can be drank, after it has descended into the lower part of the cup; but if it should be necessary to keep it hot a longer time, the cup may be placed in a small quantity of boiling water, contained in a small saucepan, or other fit vessel, placed near the fire.

When all the Coffee has passed into the lower part of the cup the strainer may be taken away, and the cup may be covered with the cover of the strainer.

I do not think it possible to contrive a more simple apparatus than this for making Coffee, nor one in which Coffee can be made in higher perfection.

That represented by figure 7., which is of a size proper for making two cups of coffee, is equally simple; and as it may be made entirely of pottery, it would cost a mere trifle, perhaps not more than a shilling.

The cup, which serves in two capacities, first as a reservoir in making the coffee, and then as a cup in drinking it, (and which, in a family, may be used for other purposes,) is three inches and a half in diameter, internally, and four inches deep.

As many persons may prefer coffee-pots made entirely of Staffordshire-ware, porcelain, or other pottery, to those made of the metals, not only on account of the low prices at which they may be
10
afforded,

afforded, but also on account of their superior neatness and cleanliness, I have added the figure 8., which, on a scale of half the full size, represents a coffee-pot made of pottery, of a size proper for making five or six cups of coffee at once, or three, four, five, six, seven, or eight cups, if two strainers are used, one after the other.

When this coffee-pot is used, it will be necessary to place it in boiling water to keep it hot, and it will be useful to cover the whole with a cylindrical vessel turned upside down; by which means both the strainer and the coffee-pot will be surrounded by hot steam, which will contribute very essentially to the goodness of the Coffee.

As soon as the Coffee has passed into the coffee-pot the strainer may be taken away; and the coffee-pot covered with the cover, which is common to it, and to the strainer.

I shall conclude by a few observations, on the means that may be used for preserving ready made Coffee, good for a considerable time, in bottles.

*How to
preserve Coffee
ready-made*

The bottles having been made very clean, must be put into clean cold water, in a large kettle, and the water must be heated gradually, and made to boil, in order that the bottles may be heated boiling hot.

The Coffee, fresh prepared and still boiling hot, must be put into these heated bottles, which must be immediately well closed with good sound corks.

The

The bottles must then be removed into a cool cellar, where they must be kept well covered up in dry sand, in order to preserve them from the light.

By this means ready-made Coffee may be preserved good for a long time, but great care must be taken not to let it be exposed to the light, otherwise it will soon be spoiled.

When wanted for use the Coffee must be heated in the bottle and before the cork is drawn; otherwise a great deal of the aromatic flavour of the Coffee will be lost in heating it. And in order that it may be heated in the bottle, without danger, the bottle must be put into cold water, and this water must be gradually heated till the Coffee has acquired the degree of heat which is wanted. The cork may then be drawn, and the Coffee poured out, and served up.

As good Coffee is very far from being disagreeable when taken cold, and as there is no doubt but it must be quite as exhilarating when cold as when it is taken hot, why should it not be made to supply the place of those pernicious drams of spirituous liquors, which do so much harm?

Half a pint of good cold Coffee, properly sweetened, which would not cost more than half a pint of porter, would be a much more refreshing and exhilarating draft; and would no doubt be incomparably more nourishing.

How much then must it be preferable to a dram of gin!

The

The advantages and disadvantages to agriculture and commerce, which would arise from the introduction of a new beverage for supplying the place of malt liquors and ardent spirits distilled from grain; must be estimated and balanced, by those whose knowledge of political economy fits them for determining these most intricate and important questions.

END OF THE EIGHTEENTH ESSAY.

Strahan and Preston,
Printers-Street, London.



Just published,

BY T. CADELL AND W. DAVIES, STRAND,

New Editions of the first Ten Essays of Count RUMFORD,
in 3 vols. 8vo. Price 1l. 11s. 6d. in boards.

ALSO,

ESSAY XVI. Of the Management of Light in Illumi-
nation, 2d edition.

ESSAY XVII. An Enquiry concerning the Light which
is manifested in the Combustion of Inflammable Bodies.

A Volume of Count RUMFORD's Philosophical Papers,
illustrated by Engravings, printed uniformly with the Essays.
Price 10s. 6d. in boards.

Fig. 1.

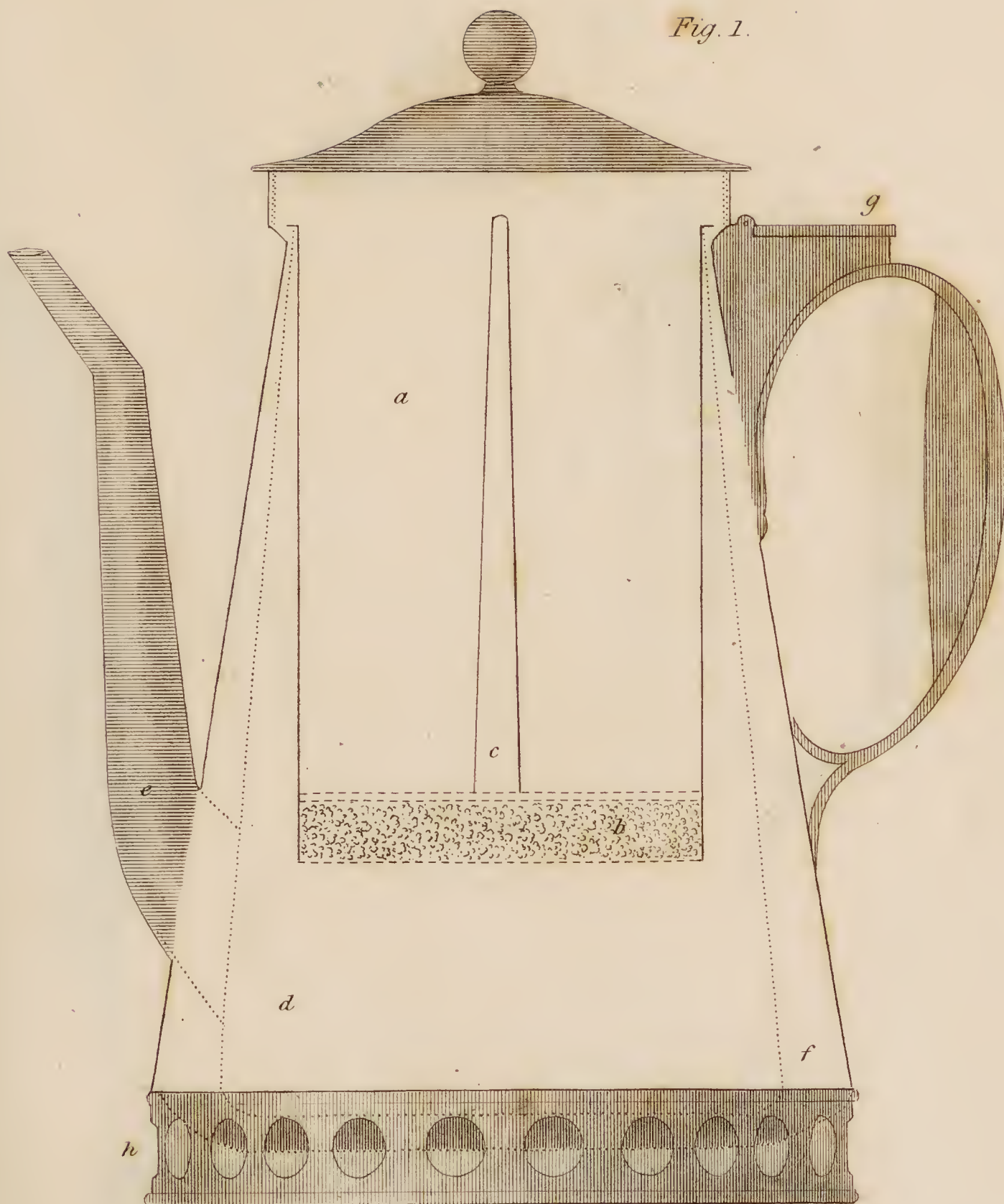


Fig. 2.

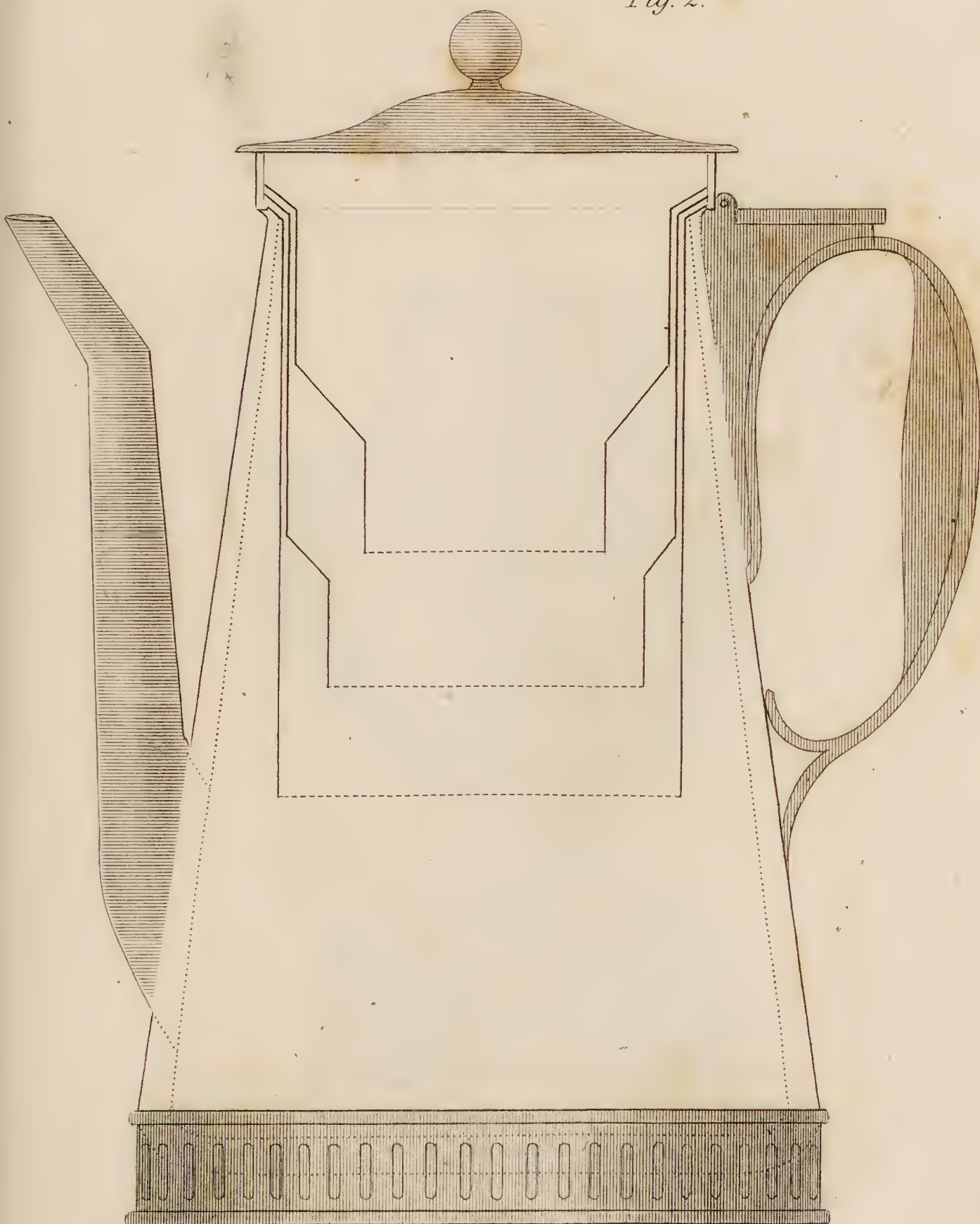


Fig. 3.





Fig. 4.

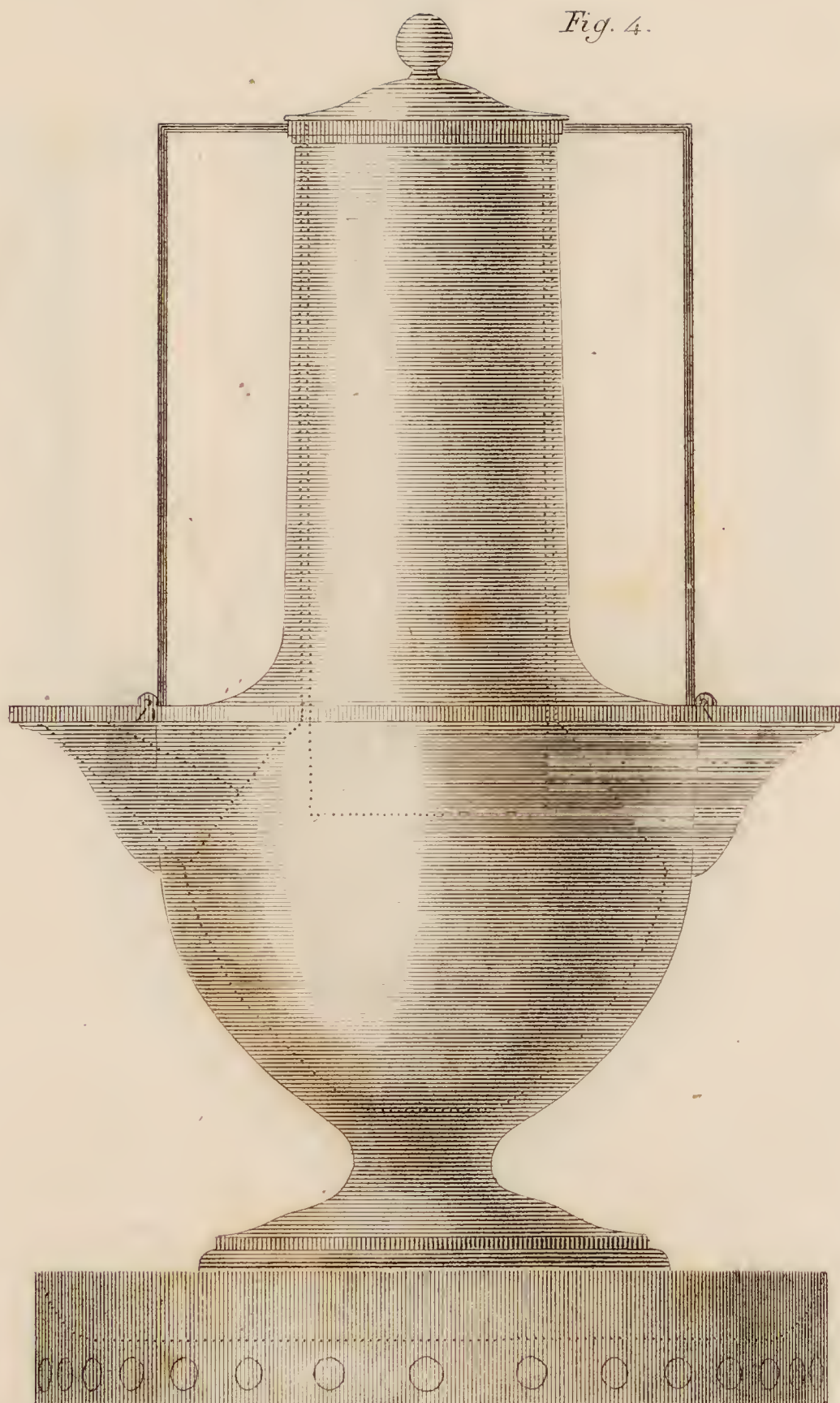




Fig. 5.

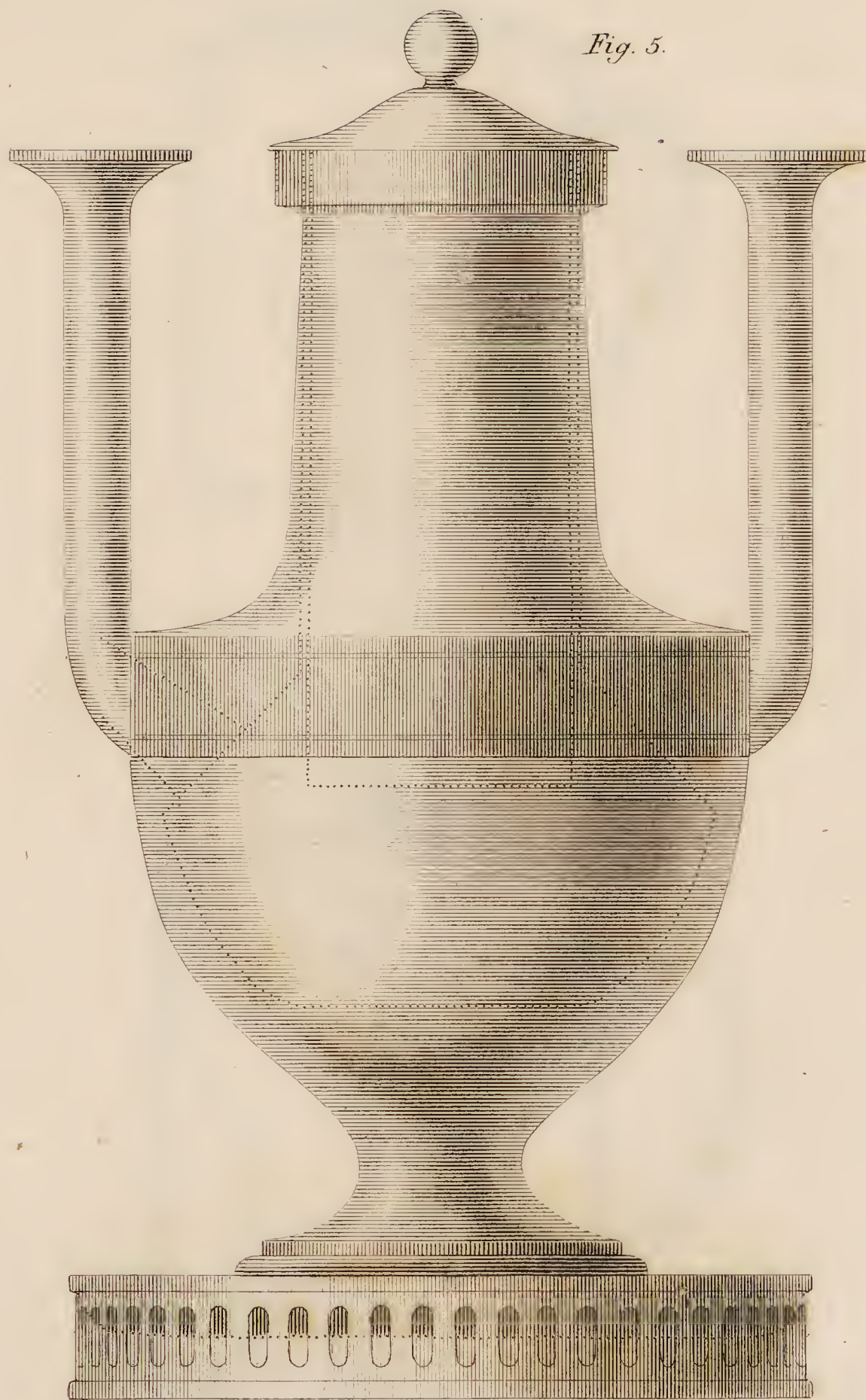




Fig. 6.

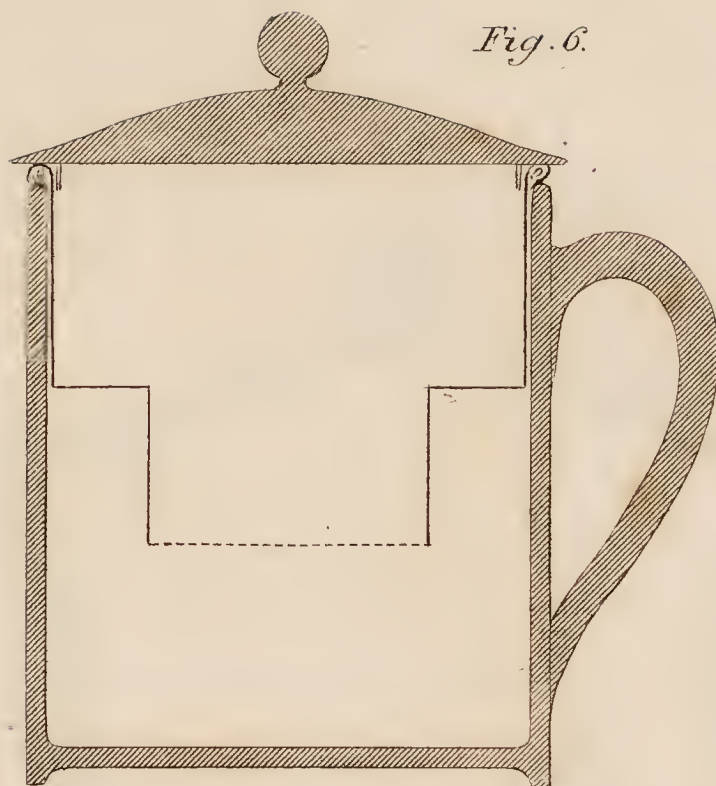


Fig. 7.

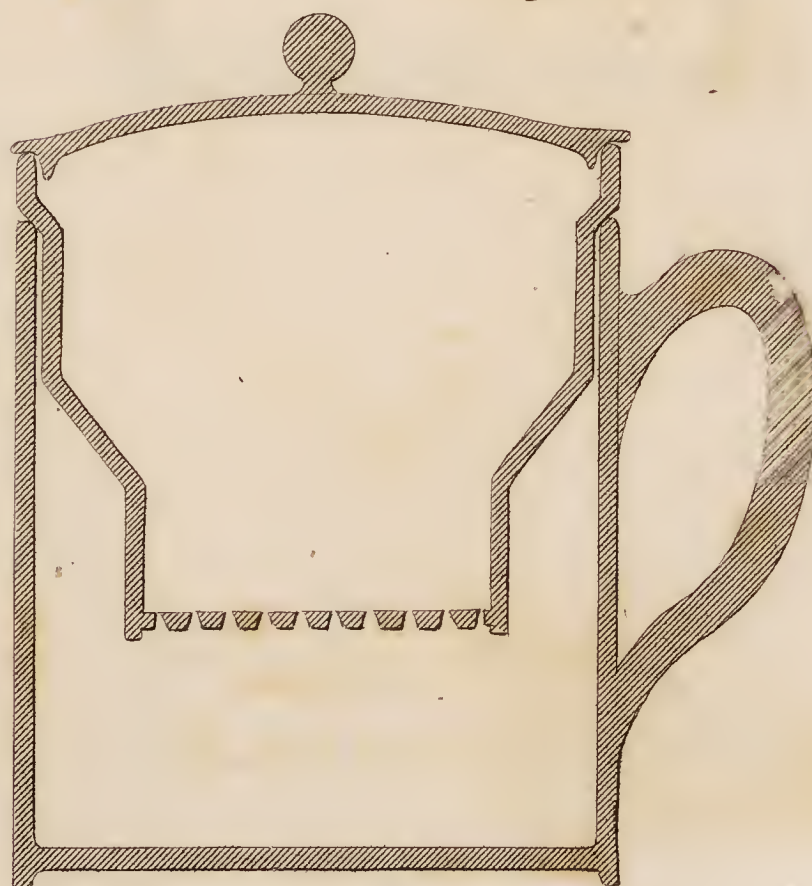




Fig. 8.

